Remarks/Arguments

Claim Summary

Claims 1, 2, 4-35 and 38 remain pending in the application.

Allowable Claims

Applicants acknowledge with thanks the indicated allowability of claims 31-32.

35 U.S.C. ¶103

Claims 1-2, 4-10, 13-18, 19-25, 29-30, 33-35 and 38 were rejected under 35 U.S.C. ¶103 as being unpatentable over Kawasaki et al. (US 4795529) or Okudaira et al. (US 4985114) in view of Robaato et al. (JP 03224226) for the reasons stated at pages 2-5 of the Office Action. Applicants respectfully traverse these rejections.

Initially, Applicants note that Robaato et al. (JP '226) has a U.S. counterpart, namely, U.S. Patent No. 5,170,098.

In each of the rejections, the Examiner states:

> "However, in a method of plasma generation, Robaato et al teach that an impedance matching network for plasma generating apparatus, that is equipped with a feedback mechanism consisting of an impedance matching circuit and the like and compensating for an impedance mismatch by adjusting or changing at least one feedback parameter such as a microwave power or the like and thereby establishing a substantially constant plasma state (see abstract and constitution page).
>
> Therefore, it would have been obvious to … combine Robaato et al's teaching into Kawasaki et al's [or Okudaira et al's] process for establishing a stable plasma by inhibiting fluctuation in the plasma impedance as taught by Robaato et al."

As explained below, even if Robaato et al. was somehow combined with Kawasaki et al. and Okudaira et al., the resultant would not render obvious the now-claimed invention.

Robaato et al. discloses a system whereby changes in plasma impedance are recognized by an impedance sensing device, and control circuitry then alters a parameter such as microwave power, gas flow or gas pressure in order to return the plasma impedance to its original value. The system is concerned with a steady state etch or deposition process in order to achieve a constant etch or deposition rate. Therefore, the objective of Robaato et al. is to maintain a near constant plasma impedance.

The system of Robaato et al. deals with relatively slow changes to plasma impedance with occur as the chamber conditions slowly deteriorate, and relies upon adjustment to one of the major parameters of plasma generation power, gas flow or gas pressure to achieve a constant plasma impedance.

If one of ordinary skill were to somehow combine the teachings of Robaato et al. with Kawasaki et al. and/or Okudaira et al., the result would be a system directed to maintaining steady state etch and deposition processes in each **individual** etch and deposition process, thereby achieving a constant etch and deposition rates.

In contrast, the presently claimed invention at least partially stems from the insight that the cyclical, alternate etching/deposition techniques suffers from a problem in the transition regions between the etching and deposition steps and from the deposition to etching steps. This problem is that the plasma impedance can vary rapidly and dramatically, leading to plasma instability or even extinguishing of the plasma (see for example, page 13 of the present application). It should emphasized that these transition regions generally involve a rapid change between very different processing conditions, it being likely that the plasma formation power will differ between the etch and deposition steps, the gases will be different with different flows, and the

chamber pressure may differ as well. This is in direct contrast with Robaato et al., which, as noted above, is only concerned with maintaining an essentially steady state condition during either an etching or a deposition process. There is no teaching or even suggestion in Robaato et al. to stabilize the plasma during a transition region in an alternate etch/deposition process.

Kawasaki et al. and Okudaira et al. each teach cyclical, alternating etching/deposition techniques. In the meantime, Robaato et al. proposes certain solutions to the problem of maintaining the near constant plasma impedance during a steady etch or deposition process. However, none of these references teaches or even suggests that there may be a problem in the transition regions, let alone suggest what the solution might be. In particular, none of the references of record (i) identify that a problem exists in the transition regions or (ii) provide a solution to this problem.

For at least the reasons stated above, Applicants respectfully contend that 1-2, 4-10, 13-18, 19-25, 29-30, 33-35 and 38 define over the teachings of Kawasaki et al. and Okudaira et al. in view of Robaato et al.

The remaining claims 11-12 and 26-28 were also rejected as being unpatentable over Kawasaki et al. or Okudaira et al. in view of Robaato et al., and further in view of Sadinsky (US 5424691) or Leiphart (US 5882488). However, Applicants respectfully traverse these rejections for at least the same reasons stated above in connection with claims 1-2, 4-10, 13-18, 19-25, 29-30, 33-35 and 38.

Conclusion

No other issues remaining, reconsideration and favorable action upon the claims now pending in the application are requested.

Respectfully submitted,

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July 23, 2007

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